

CLAIMS

What is claimed is:

1. A silicon controlled rectifier with a controlled guard
5 ring structure comprising:
 - a bridging modified lateral silicon controlled rectifier structure of a first conductivity type having a first lightly doped well region of a second conductivity type and a second lightly doped well region of said first conductivity type in a substrate having said first conductivity,
10 wherein said second lightly doped well region adjacent to said first lightly doped well region, and said second conductivity type opposites to said first conductivity type;
 - a first node is electrically coupled to a first heavily doped region of said second conductivity type and to a second heavily doped
15 region of said first conductivity type, wherein each said heavily doped region in the concentration is higher than each said lightly doped well region;
 - a second node is electrically coupled to a fourth heavily doped region having said first conductivity type and to a third heavily doped
20 region having said second conductivity type, wherein the electrical type of said second node opposites to said first node;
 - a controlled guard ring in said first lightly doped well region;
 - a switch having a first terminal and a second terminal, wherein said first terminal is electrically coupled to said first heavily
25 doped region and said second terminal is electrically coupled to said controlled guard ring; and
 - a control circuit is electrically coupled to said switch.
2. The silicon controlled rectifier with a controlled guard
30 ring according to claim 1, wherein said switch is a metal oxide

semiconductor transistor.

3. The silicon controlled rectifier with a controlled guard ring according to claim 1, wherein said first node is anode.

4. The silicon controlled rectifier with a controlled guard ring according to claim 1, wherein said second node is cathode.

5. A silicon controlled rectifier with controlled guard ring structure comprising:

a bridging modified lateral silicon controlled rectifier structure of a first conductivity type having a first lightly doped well region of a second conductivity type, a second lightly doped well region of said second conductivity type, and a third lightly doped well region of said first conductivity type in a substrate having said first conductivity, wherein said third lightly doped well region adjacent to said second lightly doped well region, and said second conductivity type opposites to said first conductivity type;

a first node is electrically coupled to first heavily doped region of said second conductivity type and to second heavily doped region of said first conductivity type, wherein each said heavily doped region in the concentration is higher than each said lightly doped well region;

a switch having a terminal, wherein said terminal is electrically coupled to said fifth heavily doped region;

a second node is electrically coupled said switch, wherein the electrical type of said second node same as said first node;

a third node is electrically coupled to a fourth heavily doped region of said first conductivity type and to a third heavily doped region of said second conductivity type, wherein said electrical type of said third node opposite said first node and said second node;

a control circuit is electrically coupled to said switch.

6. The silicon controlled rectifier with a guard ring structure according to claim 5, wherein said switch is a metal oxide semiconductor transistor.

7. The silicon controlled rectifier with a guard ring structure according to claim 5, wherein said first node and said second node is anode.

8. The silicon controlled rectifier with a guard ring structure according to claim 7, wherein said first node and said second node can be electrically coupled different application voltage respectively.

9. The silicon controlled rectifier with a guard ring structure according to claim 7, wherein said second node can electrically couple to said first node, such that said first node and said second node can be electrically coupled to an application voltage.

10. The silicon controlled rectifier with a guard ring structure according to claim 5, wherein said third node is cathode.

11. A silicon controlled rectifier with a controlled guard ring structure comprising:

a substrate having a first conductivity type, a first lightly doped well region having a second conductivity type, and a second lightly doped well region having said first conductivity type adjacent to said first lightly doped well region within said substrate, wherein said second conductivity type opposites to said first conductivity type;

a first heavily doped region having said second conductivity type in said first lightly doped well region;

a second heavily doped region having said first conductivity type in said first lightly doped well region;

5 a third heavily doped region having said second conductivity type in said second lightly doped well region;

a fourth heavily doped region having first conductivity type in said second lightly doped well region;

10 a fifth heavily doped region having said second conductivity type in said first lightly doped well region;

a sixth heavily doped region having said first conductivity type in said first lightly doped well region and in said second lightly doped well region, such that said sixth heavily doped region overlaps a junction between said first lightly doped region and said second lightly doped well region;

15 an anode is electrically coupled to said first heavily doped region and to said second heavily doped region;

a switch having a first terminal and a second terminal, wherein said first terminal electrically couple to said second heavily doped region and said second terminal electrically couple to said fifth heavily doped region;

a control circuit is electrically to said switch; and

a cathode is electrically coupled to said third heavily doped region and to said fourth heavily doped region.

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12. The silicon controlled rectifier with controlled guard ring structure according to claim 11, wherein said fifth heavily doped region is a controlled guard ring.

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13. The silicon controlled rectifier with controlled guard

ring structure according to claim 11, wherein said switch is a metal oxide semiconductor transistor.

14. The silicon controlled rectifier with controlled guard
5 ring structure according to claim 11, wherein said controlled circuit is a resistor-capacitor circuit.

15. The silicon controlled rectifier with controlled guard
ring structure according to claim 14, wherein said controlled circuit
10 controlling the function of said switch.

16. A silicon controlled rectifier with a controlled guard well ring structure comprising:

a substrate having a first conductivity type, a first lightly
15 doped well region having a second conductivity type, a second lightly doped well region having said second conductivity type, and a third lightly doped well region having said first conductivity type adjacent to said second lightly doped well region within said substrate, wherein said second conductivity type opposites to said first conductivity type;

20 a first heavily doped region having said second conductivity type in said first lightly doped well region;

a second heavily doped region having said first conductivity type in said first lightly doped well region;

25 a third heavily doped region having said second conductivity type in said third lightly doped well region;

a forth heavily doped region having said first conductivity type in said third lightly doped well region;

a fifth heavily doped region having said second conductivity type in said second lightly doped well region;

30 a sixth heavily doped region having said first conductivity type

in said substrate and said first lightly doped well region, such that said sixth heavily doped region overlaps a junction between said substrate and said second lightly doped well region;

5 a first node is electrically coupled said first heavily doped region and to said second heavily doped region;

a switch having a terminal, wherein said terminal is electrically coupled to said fifth heavily doped region;

a second node is electrically coupled to said switch;

a control circuit is electrically coupled to said switch; and

10 a third node is electrically coupled to said third heavily doped region and to said fourth heavily doped region.

17. The silicon controlled rectifier with a controlled guard ring structure according to claim 16, wherein said second lightly doped well region is a controlled well guard ring.

18. The silicon controlled rectifier with controlled guard ring structure according to claim 16, wherein said switch is a metal oxide semiconductor transistor.

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19. The silicon controlled rectifier with controlled guard ring structure according to claim 16, wherein said control circuit is a resistor-capacitor circuit.

20. The silicon controlled rectifier with controlled guard ring structure according to claim 19, wherein said control circuit controlling the function of said switch.

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